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JAMES LIND,
PIONEER OF NAVAL HYGIENE

BY

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Physician to Haslar Hospital.

THE abolition of scurvy in the Navy, in 1796, was a stroke of preventive medicine comparable in its sanitary and economic effects to the control of malaria about a century later, and was so complete that James Lind is now little more than a name.

He was born in Scotland in 1716, but does not appear to have been related to another James Lind (1736-1812), M.D., F.R.S., also accorded a niche in the "Dictionary of National Biography," and born in Scotland; for when quoting his namesake's remarks on the putrid fever of Bengal, he describes him as his friend without further qualification. He began his medical career on December 22, 1731, as a registered apprentice to

George Langlands, Fellow of the Royal College of Surgeons of Edinburgh. From 1739 to 1748 he was a Surgeon in the Royal Navy, and in this capacity visited Minorca, the coast of Guinea, the West Indies, and the Mediterranean. Almost his longest cruise was one of ten weeks in H.M.S. "Salisbury," under Commodore the Hon. G. Edgcumbe, during which eighty out of 350 sailors were laid low by scurvy. This experience, and the publication of the Rev. R. Walter's description of Anson's voyage round the world, with its record of fatal scurvy in 75 per cent. of the crew, stimulated him later to write what was first intended to be a short paper for the memoirs of a Naval Medical Society, but grew into a book of more than 400 pages. In 1748 he returned to Edinburgh, where he took his M.D. degree, and on May 1, 1750, was elected a Fellow of the Royal College of Physicians. Of this body he became treasurer in 1757, only to resign the post on being appointed on June 1, 1758, to succeed Dr. G. Cuthbert as Physician to the Royal Naval Hospital, at Haslar, four years after it was opened. During this ten years' residence in Edinburgh he brought out his great works on scurvy and on naval hygiene, which so fully justified his appointment to Haslar. The classical "Treatise on the Scurvy," dedicated to Lord Anson, appeared in 1754, went into a second edition in 1757, and a third in 1772, and was translated into French by Mere of Montpelier. In 1757 he brought out "An Essay on the most Effectual Means of Preserving the Health of Seamen in the Royal Navy," dedicated to his former Commander, Lord Edgcumbe, which also reached a third edition, the second (1762) and third (1774) being published "by Authority of the Lords Commissioners for executing the office of Lord High Admiral of Great Britain, Ireland, &c." It was translated into French, German and Dutch.

At this time the posts of medical officers to the Royal Naval Hospitals were on a different footing from those of the Navy, and were not necessarily filled from those who had served in the fleets;¹ and the status of physicians was far superior to that of surgeons, who had but recently (1745) withdrawn from the ancient Company of Barber-Surgeons in order to form a separate company. When first opened, in 1754, Haslar was only a third of its present size, but later, when the two side-wings were in full working order (1762), the complement of patients was very large; in 1779 it was 1,900, thus providing an ample field for observation which Lind utilized to the full.

Lind's resignation of the post of Physician to Haslar, on account of the infirmities of age, was sent in on June 18, 1783, and was accepted on June 30, a minute being entered in the records to the effect that his salary ceased at midsummer.² The article in the "Dictionary of National Biography," on which I have freely drawn, states that he remained Physician to Haslar until his death. This mistake is not altogether surprising, as the same post was held successively by a father and son with the same initial. After the unequalled period of twenty-five years (1758 to 1783) as professional head of the hospital, James Lind was

¹ In 1805 an Order in Council decreed that these appointments should be held only by those who had served in the public service afloat.

² For the extracts from the Hospital Records I am indebted to Surgeon-General J. J. Dennis, M.D., of the Royal Naval Hospital, Haslar.

succeeded by his son John, who had been appointed Assistant Surgeon to Haslar on February 26, 1772, and then promoted to be Assistant Physician with a salary of £200 a year on July 14, 1778, an additional grant of £30 a year for house rent being made on August 14 of the same year. The hospital records show that on August 14, 1772, shortly after his first appointment, he was granted leave of absence to proceed to London to pass a medical examination.

During most of James Lind's time the hospital was administered by its physician and council, and though the physician was the nominal head his hands were rather tied by the council, and also by the Board of the Sick and Hurt Sailors in London, which had the power of final decision and occasionally sent a Commissioner to visit the hospital, for example, Commissioner Maxwell in 1768. As a result of this divided control firm action was often watered down to a compromise, and the difficulties of managing a hospital staffed by rather turbulent officials, both male and female, and full of lawless sailors, many of whom were the victims of press-gangs and therefore regarded the hospital as a prison, were considerable. The position was modified in the later part of James Lind's term of office by the appointment, as president of the hospital council, of a Commissioner to represent the Board of the Sick and Hurt Sailors in London. The first mention in the hospital records of this official is on February 2, 1781, and refers to Commissioner Corbett, who was succeeded by Commissioner J. J. Johnston (a medical man) on July 23, 1793, who in his turn gave way to Captain William Yeo, R.N. (*obit* 1808) on his appointment as Governor of the hospital on August 26, 1795, John Lind still remaining as Physician. Of the way in which this last change was effected there are two accounts. Turnbull, in the manuscript "History of the Naval Medical Service from the earliest date to 1904," which he deposited in the library at Haslar, states that an order in Council of July 3, 1793, sanctioned the appointment to the Royal Hospitals at Haslar and Plymouth of one officer of post captain's rank and three lieutenants in order to "prevent in the most effectual way the inconveniences which have frequently been felt from a want of proper discipline and subordination in the said hospitals." According to Tait,¹ on the other hand, Trotter, when appointed Physician to the Fleet in 1794, reported to the Commander-in-Chief that the presence of executive officers was necessary to keep the seamen in order; an inquiry was accordingly made with the result that a post captain and two lieutenants were appointed. The outcome of this change was far from peace, as is shown by Tait's account of the skirmishes, sometimes with a very humorous side, between the Governor and his subordinates, especially the medical staff. The administration of the hospital remained in the hands of an executive officer, who in 1820 took the title of Superintendent instead of Governor, until 1869, when control was vested in a medical authority—an Inspector-General.

James Lind died at Gosport on July 13, 1794, and was buried at Porchester. Some years ago an unsuccessful attempt was made by Sir T. D. Gimlette, then Inspector-General at Haslar, to transfer the memorial tablet from Porchester Church to St. Luke's Church in the

¹ Tait, "History of Haslar Hospital," p. 88.

grounds of Haslar Hospital. In 1783 Sir George Chalmers, Bt., painted his portrait; an etching of this forms the frontispiece to the sixth edition of his "Essay on Diseases Incidental to Europeans in Hot Climates," for a photograph of which I am much indebted to F. W. Hooper, Esq., Superintending Pharmacist at Haslar Hospital.

Lind was recognized abroad as shown by his election as an honorary member of medical societies in Paris and Copenhagen, whereas apart from being F.R.S. Edinburgh, he appears to have shared the fate of a prophet in his own country. His name will always be famous in connection with the prevention of scurvy, but his activities, as I shall attempt to show briefly, ranged widely over naval medicine and hygiene.

In his "Treatise on the Scurvy" Lind fully considered its history, nature, causes, and cure, and gave the first considerable chronological list (*Bibliotheca scorbutica*, as he calls it) of the publications on this disease from 1534 onwards. As evidence of the importance of the subject he points out that "in the late war scurvy cut off more valuable lives in our fleets than the united efforts of the French and Spanish arms," and that "the world had now almost despaired of finding out a remedy of preventing this dreadful evil at sea." Trotter¹ refers to an occasion (probably in 1779), when so many cases were "landed at Haslar, on the fleet coming from sea, that the hospital could not contain them; they were lodged in the chapel and in tents." Lind advocated as a prophylactic against scurvy the use of fresh vegetables and fruit, especially oranges and lemons, and, when they were not available, preserved orange and lemon juice. This was no discovery on his part, for the Dutch, as he mentions on the authority of Ronssius, a physician of Gouda (1564), had employed oranges and lemons for this purpose nearly two centuries before; further in 1593 Sir R. Hawkins protected his crew on the "Dainty" from scurvy, and in 1600 Commodore James Lancaster² of the East India Company had equal success on a voyage to Table Bay by means of lemon juice, which was subsequently recommended by Woodall³ (1636). As pointed out by Blane, this neglect, oblivion, and revival of a useful remedy is even more strikingly shown in the history of hermodactyl (*colchicum*) recommended for gout by Trallian, of Asia Minor, in the fourth century and then forgotten until 1763, when it was brought into use by Baron Störk; it was almost certainly the active agent in the famous secret remedy of that period—"eau médicinale de Husson"—for gout.

Lind described a method of preserving orange and lemon juice so that it could be employed on prolonged voyages.⁴ In this process the purified juice was concentrated by heat to the consistence of a thick syrup, and as originally carried out in common earthenware vessels gave rise to a soluble lead salt from the action of the acids on the leaden glaze.

¹ Trotter, "Medicina Nautica," 1803, vol. iii, p. 387.

² Vide "Hakluytus Posthumus or Purchas his Pilgrimes," 1625, vol. i, p. 147; and Clowes's "History of the Royal Navy," 1897, vol. i, p. 655.

³ Woodall, "The Surgeon's Mate," 1636, p. 165.

⁴ In 1757 Lind's friend "the ingenious Mr. Ives," Surgeon to the Squadron, induced Admiral Watson to provide his ships in the East Indies with an ample supply of lemon juice. This appears to be the first time that Lind's recommendations were adopted in a Fleet. (Blane, "Select Dissertations on Several Subjects of Medical Science," 1822, p. 69.)

Lind described this source of "death in the pot" in a paper in the *Edinburgh Monthly Magazine* of May, 1754. It may be mentioned in passing that James Hardy, a surgeon of Barnstaple, subsequently (1778) put forward this action of acid on the lead glaze of earthenware vessels as the way in which cider became impregnated with lead, and attempted to modify to this extent the accepted view of Sir G. Baker (1767) that the impregnation of cider with lead, which he proved to be the cause of Devonshire colic, took place in the presses. It is only fair to add that the danger from keeping cider in glazed earthenware vessels was well known to Baker. Lind followed the practice of the Dutch in another detail, namely, in advising sauerkraut as a prophylactic. This preparation was made from yellow cabbage, the leaves of which were cut in November into thin slices and strewn in layers in a cask and then covered with salt. According to Lind, if the cabbage leaves thus preserved are washed, "their virtue is the same as if taken fresh out of the garden."

Most unfortunately for the Navy forty-one years passed before Lind's recommendations as to the use of lemon juice were officially carried into effect. The state of affairs in 1791 is thus described by Thomas Trotter¹ "for the prevention of scurvy the British Navy is at present provided with sauerkraut, elixir of vitriol, malt and essence of wort" (or malt before fermentation); of the first he says that it is not worth the expense which it has cost the Government; of the elixir of vitriol, originally suggested by Mead and largely used in the Navy as a local application in free dilution to the gums, he adds that it is merely a placebo, and of malt that it is useless. He recommended fresh vegetables and fruit, such as lemons, oranges, and limes, but threw cold water on Lind's warm advocacy of the preserved juice of lemons and oranges on the grounds that it failed in the hands of the famous Captain Cook on his voyage to the southern hemisphere in 1773-4, and others, as insisted on by Milman (1782), and that it underwent fermentation and became mouldy. Sir John Pringle, however, argued that the failure of lemon juice was due to the insufficient quantity used, and tried, though unsuccessfully, to induce his friend Captain Cook to give it a further trial; and Trotter, who seems curiously unwilling to accept its value, suggests that it was often adulterated with vinegar. After, just as before, Lind's advocacy of the proper treatment, various methods of curing and preventing scurvy were put forward, some of these being modifications of old ones; among them may be mentioned a mixture of vinegar and nitre (Paterson),² phosphoric acid (Fairfoul), crystallized citric acid, spruce beer, infusion of hops (Thomson),³ porter, and cider; and several writers stated that the substitution of beer for grog was followed by diminution of scorbutic symptoms.

It was Sir Gilbert Blane's powerful influence that eventually brought Lind's recommendations into official use. This reformer of naval medicine had, in 1782, been instrumental in curing an outbreak of scurvy on twenty-eight ships of the line, by means of fresh lemons, limes, and

¹ Trotter, "Observations on the Scurvy." Second edition, p. 181, dated January, 1792.

² Paterson, D., "A Treatise on Scurvy." 1795.

³ Thomson, F., "An Essay on the Scurvy," London, 1790.

oranges, and as the outcome of his advice in 1793 to Sir Alan Gardner, every seaman in H.M.S. "Suffolk" during a voyage of twenty-three weeks in 1794, without touching at any port, received two-thirds of a fluid ounce of lemon juice and 2 oz. of brown sugar daily, with the result that scurvy did not appear on the ship. Blane, who had thus tested both the curative and prophylactic effects of lemon juice, gave the most full and generous credit to Lind, and was most emphatic that nothing in the least degree could compare with it. In 1795, a few months after Blane had been appointed a Commissioner of the Board of the Care of Sick and Wounded Seamen, an Admiralty order enjoining the use of lemon juice was issued. It is rather pathetic that Lind who died on July 13, 1794, did not live to see the full fruits of his labours. The effect of this Admiralty order was almost magical; scurvy at once practically disappeared from the Fleets and Naval Hospitals, and the annual average of the naval sick sent to naval hospitals was halved. Thus, in 1797 Earl Spencer, First Lord of the Admiralty, being at Portsmouth, visited Haslar, and was anxious to see scurvy, but there was no case in the hospital. This may be contrasted with the state of affairs in 1779, when the Channel Fleet after a ten weeks' cruise in the Bay of Biscay returned to Portsmouth with 2,400 cases of scurvy. It is noteworthy that this great step in naval preventive medicine, which took so long to accomplish, almost coincided with the publication of Jenner's long and patient work on vaccination (1798).

It may naturally seem strange that Lind's recommendations were so tardily adopted, for they were neither boycotted nor ignored, reference being made to them, though sometimes rather coldly, by most of the numerous contemporary writers on scurvy; and, as has already been mentioned, his treatise went into three editions. Trotter, whose praise of Lind during his lifetime is quoted on page 190, in 1803 expressed his surprise that Lind had had so many opportunities of examining cases of scurvy after death, and went on to say "the plain truth of the matter is, his method of cure was imperfect; for a man dying of scurvy is not known at the present day." It certainly is grossly unfair to saddle Lind with the blame for the results of the failure to carry out his injunctions for the prevention of scurvy. Moreover, in a previous sentence, Trotter mentioned that on one occasion scorbutic sailors died while being conveyed from Spithead to Haslar. It does not appear that Lind's personality was likely to cause antagonism, for the records of Haslar show that he was eminently a man of peace. He had been a surgeon in the Navy, and there is no reason to suppose that his appointment to an important shore billet, such as Haslar, aroused resentment or passive resistance among the medical officers of the Navy. Herbert Spencer¹ used the interval of forty-one years which the Admiralty allowed to elapse before acting on Lind's recommendations, as an apt illustration of the inertia and torpor of administrative bodies. Perhaps the real explanation is merely that his efforts met with the same prejudice and opposition that great advances, for example Jennerian vaccination and Listerism, commonly encounter.

Another practical reform in naval hygiene made by Lind was his simple method of obtaining potable water by distillation of sea-water. It had long been known that distillation deprived sea-water of its salt,

¹ Spencer, "Study of Sociology," Fifteenth edition, p. 162. London, 1889.

but as this distilled water always had a disagreeable taste, which was supposed to be due to "bitumen and a spirit of sea salt," various ingredients such as "Lapis infernalis"¹ and calcined bones (Appleby 1754), soap lees (Butler), or powdered chalk (Stephen Hales) were added to the sea-water as preventives. In practice, however, this had grave disadvantages. Lind pointed out that this burnt (empyreumatic) taste, which is common to all distillates, especially the first few ounces, quickly disappears on exposure to the air, and he accordingly dispensed with the addition of any ingredient to the sea-water before distillation. In 1761 he demonstrated his method in Portsmouth to Mr. Hughes, the resident Commissioner of the Navy, and in May, 1762, transmitted a full account of it to the Royal Society. He employed the ordinary ship's boiler fitted with a pewter still-head and a worm placed in a closed cask (worm-tub or cooler) full of cold sea-water which could be changed and when warm utilized to fill the boiler. Fortune, however, did not smile on his efforts, for the improvement like many discoveries, was not only claimed by others but stated not to be original and to have been known to Sir F. Bacon and Sir Richard Hawkins. It must have been very galling when, four years later, Poissonnière, a French author of a treatise on diseases of seamen, received a considerable pension for the same improvement; and again in 1772 when Irving, a surgeon in the Royal Navy, was awarded a grant of £5,000 from the House of Commons for an inferior apparatus consisting of a large tin tube 6 to 8 in. in diameter and 7 to 8 ft. long, like the funnel of a stove, which was attached to a ship's copper and kept cool with mops, but was not provided with a worm. By an irony of fate Lind was placed on the Board which reported favourably on Irving's method, and, after first refusing, gave in and signed the report. That Lind's priority, which Sir Gilbert Blane subsequently endorsed, should have been thus ignored is rather puzzling, for according to Lind the Lords Commissioners of the Admiralty published the second edition (1762) of his essay "On the most Effectual Means of Preserving the Health of Seamen" as an honour "upon account of the important discovery I had then made of rendering sea-water perfectly fresh and wholesome by a simple distillation."

Under the attractive title of "A Means of Preventing a Want of Provisions at Sea," Lind described the result of an inquiry to discover the most nutritious substance which from its small bulk, the ease with which it could be prepared as food, and its stability, might be carried on board ships as a kind of emergency ration in addition to the ordinary victualling. The articles he recommended were powder of salep (meal from the dried tubers of some orchidaceous plants) and portable soup, which provide the maximum amount of protein and carbohydrate in the minimum bulk. An ounce of powdered salep and an ounce of portable soup dissolved in two quarts of boiling water made a rich thick jelly and provided enough food for a man for a day.

The familiar uniform of sailors appears not to have been established until 1857, although Clowes² quotes memoranda dealing with the naval

¹ Lapis infernalis was a synonym for nitrate of silver, and Lapis infernalis alkalinus for caustic potash, which was presumably the ingredient used by Appleby.

² Clowes, "History of the Royal Navy," 1901, vol. vi, p. 210.

uniforms of officers before this date, the earliest being in 1825. Before the introduction of the uniform the captain of each ship determined the style of clothes or "slops"—often somewhat piratical—of his crew. It is interesting to note that Lind¹ urged that the seamen of His Majesty's Service should be "put into a uniform sea-habit with some little movable badges or variations by which it might be known to what ship they belong." His object was to ensure cleanliness and to avoid infection carried by filthy articles of clothing. This suggestion was endorsed by Blane and elaborated by Trotter,² who proposed that the uniform should consist of a blue jacket, a waistcoat of white cloth trimmed with blue tape, blue trousers, and a small, round waterproof hat with a narrow belt on which should be printed the name of the ship. Trotter urged that in addition to the sanitary advantages, the adoption of such a uniform would render desertion more difficult.

Fevers, imperfectly differentiated at that time, formed a very large proportion of the cases sent from the fleet to Haslar, thus in the two years—July, 1758, to July, 1760—out of 5,743 patients admitted 2,174 were suffering from fevers, the next largest item being 1,146 victims of scurvy. The subject of fevers, the spread and prevention of infection, and disinfection therefore naturally attracted Lind's practical and observant mind. He laid much stress on the importance of fresh air and ventilation, and insisted that the most airy wards in the hospital should be devoted to fever cases. He also pointed out that when fevers became specially malignant large tents or separate huts in open fields are far better than wards, and in support of this open-air method of treatment referred to an occasion on which there were so many fever patients that some had to be put in tents, and were therefore thought to be rather hardly used; most of these, however, recovered, whereas the mortality among those lodged in the ordinary wards was very high. He expressed his disapproval of the usual position allotted to the sick on board ship, namely, "either in the fore-part of the gun deck called the bay, which is the most damp and unwholesome part of the ship, or, what is nearly as bad, in the fore-part of the hold"; and, characteristically ready with a practical remedy, urged that in warm weather the most suitable place for the sick was under the fore-castle, which, if necessary, could be protected from rain by canvas. While emphatic as to the value of fresh air and cleanliness in preventing the spread of infection, he fully realized that these means might not be sufficient to destroy the infective agent, and for this purpose employed fumigation by tobacco burnt with junk, or by charcoal fires strewn with sulphur or arsenic.

He had ample opportunities of studying jail fever (typhus) as it was common in the fleet, being often introduced by impressed men brought from Newgate and other prisons; he says that it is a mistake to consider that the infection is air borne, for it is sometimes confined to a very narrow area, such as a bed, and he instances two marines who contracted it, one after the other, from sleeping in the same bed. Examples are given to show that the infective agent is carried in filthy clothes and rags,

¹ Lind, "On the most Effectual Means of Preserving the Health of Seamen." London: Third edition, 1774, p. 7.

² Trotter, "Medicina Nautica," 1797, vol. i, p. 48.

and he insists that the infection can be destroyed by great heat, such as that of an oven. These observations, therefore, are quite compatible with the modern view that the infection is spread by lice. A reform suggested by Lind, years before it was carried out by the Navy Board in 1781, was the establishment of the so-called slop ships for the inspection, disinfection, and clothing (with "slops") of newly raised or impressed men before their distribution to the fleet, so as to prevent them from carrying infective fevers into the ships.

Blisters in fevers were highly valued by Lind both for their therapeutic effect and for the assistance which he believed that they gave in prognosis. He was firmly convinced that when blistered on the evening of admission a patient was always better next morning, and that the improvement was due to the provision of a free discharge for "purulent and tainted particles from the body"; and it became a routine in the treatment of fevers at Haslar. He stated that "in the worst fevers blisters either do not rise and fill, or discharge such yellow, greenish, fetid and highly offensive stuff, that even experienced nurses could give a pretty certain conjecture from the blisters of the different degrees of malignity of the fevers." Camphor in 5-gr. doses every four hours with large draughts of vinegar whey gave good results in his hands, but he did not speak of it as a cardiac tonic, the object with which it is now largely used abroad by hypodermic injection. In malaria Lind gave opium, and Blane, who made little use of cinchona, trusting almost entirely to opium with tonics during convalescence, remarked in 1833 that the credit for the discovery is believed to be due to him.

As a sequel to his work "On the most Effectual Means of Preserving the Health of Seamen" he brought out in 1768, "An Essay on Diseases Incidental to Europeans in Hot Climates" which passed through five editions during his lifetime, reached a sixth in 1808, and was translated into French and German. As this dealt not only with the prevention and cure of tropical diseases but also with climate and its influence on disease, he must be regarded as a pioneer in these branches of medicine. He commented on the extraordinary wastage of European life in the Tropics in the eighteenth century, which probably reached its acme in Jamaica where the whole number of the white population was buried in the course of five years. He advised that in tropical ports the sick should be accommodated in special ships, which he spoke of as hospital ships, rather than in hospitals on shore. Against the indiscriminate venesection employed to "season" persons arriving in the Tropics he raised a protest. This practice appears to have been based on two hypotheses (*a*) that most tropical diseases are inflammatory, and (*b*) that the blood of Europeans who have become immune to endemic tropical diseases is so greatly changed by the food and drink of the country as to resemble that of the immune natives. It was therefore supposed that after frequent bleedings, sufficient to remove all the original blood, the influence of the food and drink of the country would lead to the above modification of the blood in a shorter time. As a matter of fact this venesection led to a condition of debility which favoured rather than prevented infection. Although as a naval surgeon Lind had obtained some knowledge of tropical medicine and climatology, this work is not so essentially the outcome of personal experience and observation as his other writings.

Lind was a careful though somewhat diffident writer, and unnecessarily

prone, in view of his wide experience, to quote others in support of his conclusions. As a result his works, though scholarly, are sometimes rather laboured. His strong point was not originality, but sound common-sense, which enabled him to see the essentials clearly and to adapt or modify existing means to meet difficulties in a thoroughly practical manner. If we accept Broussais's dictum that "the real physician is the one who cures," Lind's services to the Navy entitle him to a high place and a lasting fame in our profession. The following estimate of Lind during his lifetime, from the pen of his somewhat critical contemporary Trotter, may fitly conclude this slight sketch. "The leading trait of his professional character has marked him the man of observation. When he first published his book, he had, no doubt, many authors to consult; but their facts were often distorted, their theories absurd, and their practice empirical, so that much was left to himself; and when he came to be Physician to Haslar Hospital, he seems to have soon formed his own opinions. Of great medical abilities that have attended military services, the army of this country can boast of a Pringle, a Cleghorn, and a Munro, and some others who have written since (the) last war, but the name of Lind stands alone in the Navy. Amidst the few advantages his situation afforded him for study, the spirit of observation never forsook him; and his works comprehend the best study of climate that has yet been published."¹ Elsewhere² Trotter speaks of him as "the father of Nautical Medicine."

¹ "Observations on the Scurvy," Introduction, p. xxii, Second edition, 1792.

² "Medicina Nautica," 1797, vol. i, p. 10.

